CASE REPORTS

Celiomesenteric anomaly with concurrent aneurysm

Kenji Matsumoto, MD, Katsunori Tanaka, MD, Kouji Ohsumi, MD, Makoto Nakamaru, MD, Hideaki Obara, MD, Shinobu Hayashi, MD, and **Masaki Kitajima, MD,** *Tokyo, Japan*

We describe a rare case of a celiomesenteric anomaly with concurrent aneurysm. The patient, a 53-year-old man, had no abdominal pain or discomfort. The presence of a celiac artery aneurysm was suspected on the basis of the results of abdominal computerized tomographic scanning and echo ultrasound scanning performed because of proteinuria. Intra-arterial digital subtraction angiographic results showed the anomaly and aneurysm. Because of the risk of rupture of the aneurysm, the lesion was repaired surgically, with the placement of an interpositional prosthetic graft. We found no previous reports of celiomesenteric anomaly with concurrent aneurysm repaired with prosthetic graft. (J Vasc Surg 1999;29:711-4.)

Although abdominal visceral artery aneurysms are not uncommon, aneurysms that involve a celiomesenteric anomaly are rare. To our knowledge, only three cases have previously been reported in the English literature.[1-3] We describe a patient who had an aneurysm accompanied by a celiomesenteric anomaly. The nature of the anomaly was that the celiac artery and the superior mesenteric artery originated from the same vessel. The lesion was repaired surgically, with the placement of an interpositional prosthetic graft.

CASE REPORT

A 53-year-old man with no abdominal pain or discomfort was admitted to our hospital on May 10, 1998, for the evaluation of a possible celiac artery aneurysm, which was suggested because of the results of abdominal computerized tomographic scanning and echo ultrasound scanning performed for proteinuria. Intra-arterial digital subtraction angiographic results revealed a celiomesenteric anomaly with concurrent aneurysm, which was about 4.0 cm in diameter and created a fusiform shape (Fig 1).

At admission, all the laboratory findings were within the normal range. No previous laboratory results were available. Because of the normal laboratory values, it was unlikely that the patient had pancreatitis, portal hypertension, or an inflammatory reaction at admission. He did have slight liver dysfunction that was probably as a result of alcoholism. The patient had no specific cardiovascular risk factors or history of trauma and no evidence of arterial dysplasia or a systemic disease (Marfan's syndrome, Behçet's syndrome, or Takayasu's arteritis) that might have produced the aneurysm.

Surgical repair was performed on May 20, 1998, through a median laparotomy and the trans-lesser-sac route.[2] The 4.0-cm aneurysm was located approximately 5.0 cm from the origin of the superior mesenteric artery, independent from the abdominal aorta and at the proximal upper edge of the head of the pancreas (Fig 2*A*). Because there was little perianeurysmal inflammation, the entire aneurysm could be visualized. The splenic, left gastric, inferior phrenic, and common hepatic arteries all originated from the aneurysm. The common hepatic artery emerged from its distal end.

The proximal and distal ends of the aneurysm and all the arterial branches were clamped. The aneurysm was resected, and a 6-mm interposition graft made of expanded polytetrafluoroethylene was placed—no suitable autogenous vein was available for grafting. A direct anastomosis between the superior mesenteric artery and the aorta would have been difficult because of the long distance between the two vessels. The splenic artery was sewn to the side of the prosthetic graft (Fig 2*B*). The left gastric and inferior phrenic arteries were ligated under the assumption that adequate collateral circulation would develop from the splenic artery. The common hepatic artery was preserved.

After revascularization, pulses were present in the distal side of the superior mesenteric artery, the splenic

From the Department of Surgery, Keio University School of Medicine.
Reprint requests: Dr Kenji Matsumoto, Department of Surgery, Keio University School of Medicine, 35 Shinanomachi, Shinjuku-Ku, Tokyo 160-8582, Japan.

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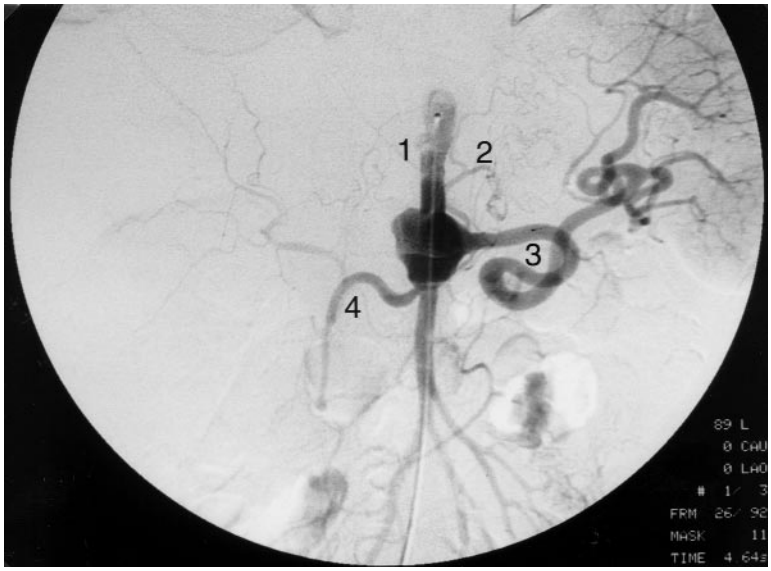

Fig 1. Intra-arterial digital subtraction angiogram shows celiomesenteric anomaly and concurrent 4.0-cm aneurysm. *1,* Origin of superior mesenteric artery; *2,* left gastric artery; *3,* splenic artery; *4,* common hepatic artery.

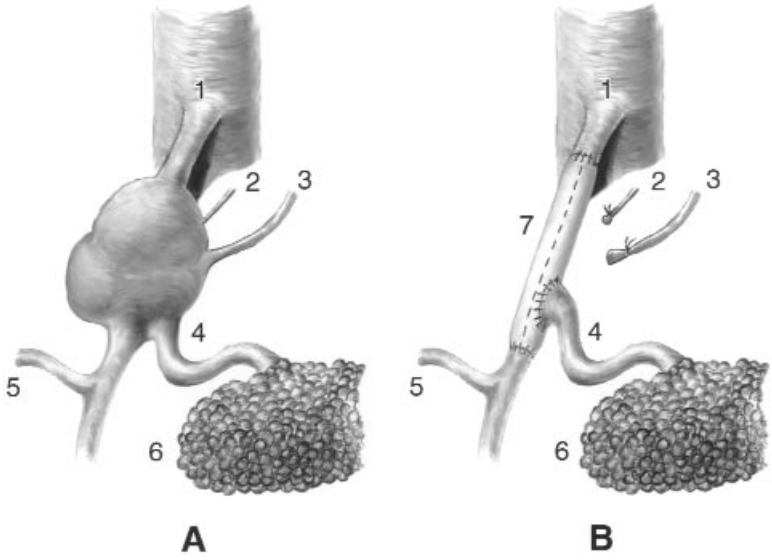

Fig 2. Operative view of aneurysm before surgical repair **(A)** and after completion of procedure **(B)**. *1,* Origin of superior mesenteric artery; *2,* inferior phrenic artery; *3,* left gastric artery; *4,* splenic artery; *5,* common hepatic artery; *6,* head of pancreas; *7,* 6-mm expanded polytetrafluoroethylene prosthetic graft.

artery, and the common hepatic artery. The postoperative course was uneventful except for transient liver dysfunction. Histopathologic examination of resected vessel tissue revealed atherosclerotic lesions but no evidence of specific changes, such as medial necrosis or inflammation (Fig 3). Postoperative intra-arterial digital subtraction angiographic results showed good patency of the repaired vessels (Fig 4). The patient was discharged to home on the 18th postoperative day.

DISCUSSION

Abdominal visceral artery aneurysms usually are located in the splenic artery (60% of lesions), the hepatic artery (20%), the superior mesenteric artery (5.5%), the celiac artery (4%), the gastro-omental and pancreatic arteries, the intestinal arteries, or the inferior mesenteric artery.[1] Celiomesenteric anomalies are rare and account for less than 1% of all the abnormal-

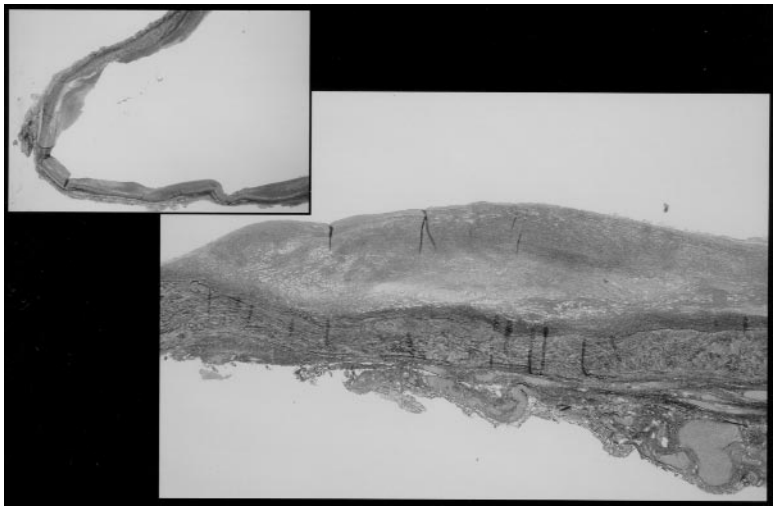

Fig 3. Histopathologic study of resected specimen (elastica van Gieson's stain: ×100 and ×200 magnifications).

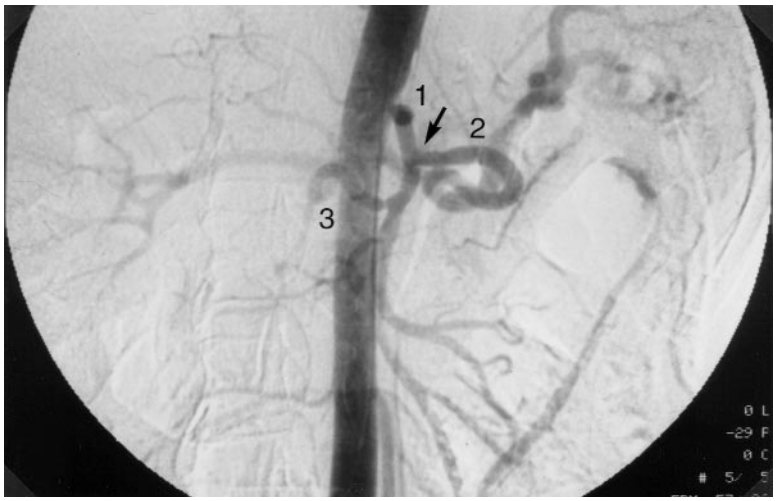

Fig 4. lntra-arterial digital subtraction angiogram obtained after aneurysm repair shows good patency at reconstructed site. *Arrow* indicates prosthetic graft. *1,* Origin of superior mesenteric artery; *2,* splenic artery; *3,* common hepatic artery.

ities of abdominal visceral arteries.[4] Celiomesenteric anomalies with concurrent aneurysms are even more unusual: we found only three previous reports of such cases in the English literature.[1-3]

Abdominal visceral artery aneurysms can be caused by medial degeneration, trauma, surgery, inflammation, infection, arteritis, collagen vascular disease, fibromuscular dysplasia, or congenital anomalies. In our case, though, histopathologic evaluation revealed only atherosclerosis. However, the relation between thc celiomesenteric anomaly and the formation of the aneurysm remains unclear. Perhaps the absence of a celiac trunk and the excessive blood inflow to the origin of the anomalous branches were responsible for the aneurysm. As in our case, patients with an abdominal visceral artery aneurysm often have no physical evidence of the disorder and the diagnosis is made incidentally on abdominal computerized tomographic scanning or echo ultrasound scanning, or at laparotomy, autopsy, or, most frequently, arteriography.[2]

Variations in the origin of the celiac and superior mesenteric arteries are a result of embryologic anomalies. In a normal embryo, abdominal visceral arteries develop from the primitive dorsal abdominal aorta through four roots: those of the left gastric artery,

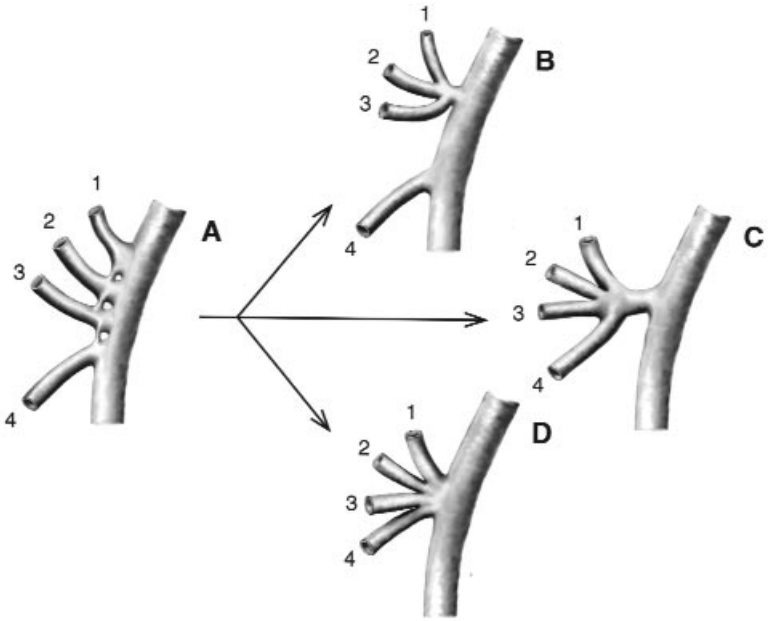

Fig 5. Embryologic development of celiac and superior mesenteric arteries. In normal embryo *(A)*, these arteries form as shown *(B)*. Absence of ventral anastomosis results in gastro-hepato-spleno-mesenteric *(C)* or celiomesenteric trunk formation *(D)*. *1,* Left gastric artery; *2,* common hepatic artery; *3,* splenic artery; *4,* superior mesenteric artery.

the hepatic artery, the splenic artery, and the superior mesenteric artery (in order of appearance; Fig 5*A*). These vessels then are joined together by a longitudinal ventral anastomosis. Normally, the anastomosis between the third and the fourth root disappears and, in 55% to 89% of the cases, this leads to the formation of the celiac and superior mesenteric arteries (Fig 5*B*).[2-4] The misplacement of the ventral anastomosis results in a variety of malformations. When the anastomosis does not form at all, a gastro-hepato-spleno-mesenteric trunk (Fig 5*C*) or celiomesenteric trunk (Fig 5*D*) develops. Our patient apparently had the former type of development.

Although abdominal visceral artery aneurysms sometimes can be treated with less invasive procedures, such as catheter embolization or a laparoscopic procedure, our patient required open surgical repair because of the need to reconstruct the superior mesenteric and splenic arteries. A midline abdominal incision often provides an adequate approach to the celiac axis or the superior mesenteric artery and can be extended into the thorax when necessary. The aneurysm can usually be exposed through the lesser sac or the transverse mesocolon.[2]

The technique used to repair the aneurysm depends exclusively on the location and the shape of the lesion. In some patients, such as ours, the aorta does not need to be controlled. If the aneurysm is saccular, aneurysmorrhaphy or dissection with patch angioplasty may be feasible, as described previously.[2,3] However, fusiform aneurysms generally should be treated with the placement of an interpositional graft to minimize the risk of recurrence of the aneurysm. In cases in which collateral circulation may not develop if the important visceral branches originating from the aneurysm are ligated, the vessels should be reconstructed to preserve organ function.

To our knowledge, our case is only the fourth case of celiomesenteric anomaly with concurrent aneurysm that has been described and the first such case treated with the placement of an interpositional prosthetic graft.

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